

HTGR Applications for CTL

Reiner Kuhr
Shaw Energy & Chemicals

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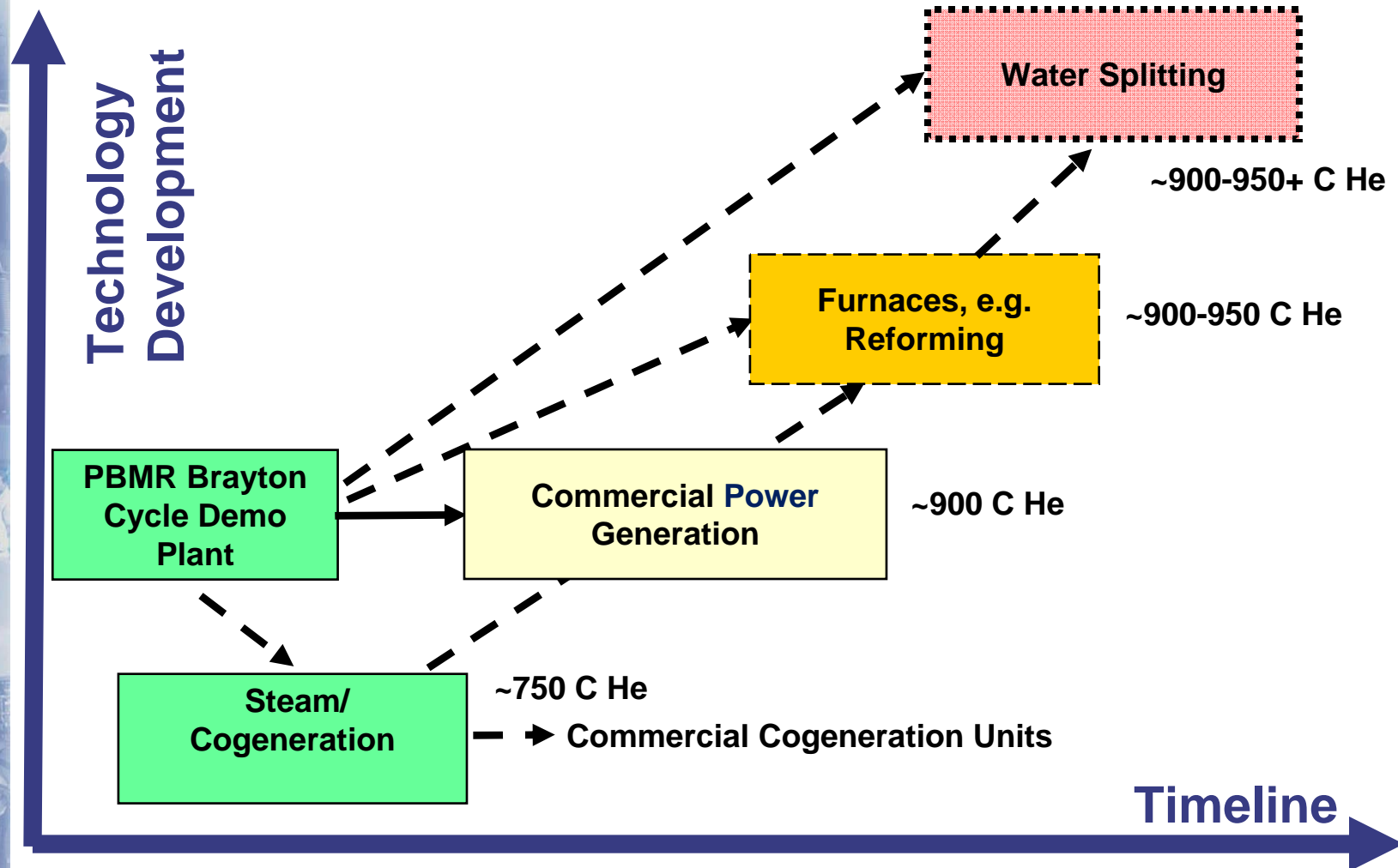


*Process Heat Applications
Special Session*

Presentation Outline

- ♦ **What HTGR applications currently look promising?**
- ♦ **How does a new CTL project use feedstocks and energy?**
- ♦ **How can HTGRs replace gas and reduce emissions?**
- ♦ **How can nuclear options be integrated with a CTL project?**

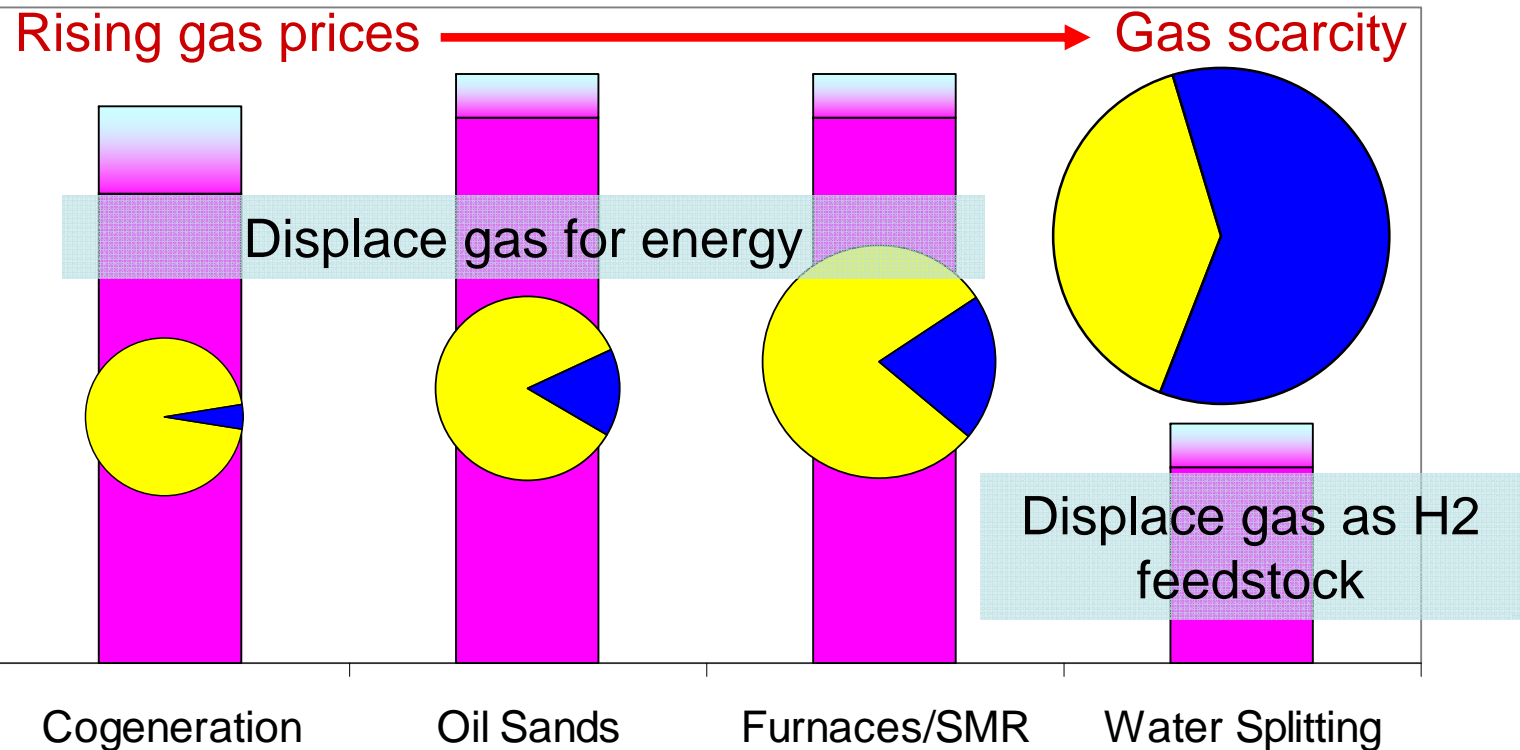
PBMR Technology Path



HTGR Gas Replacement Sequence

Natural Gas Displacement for One HTGR

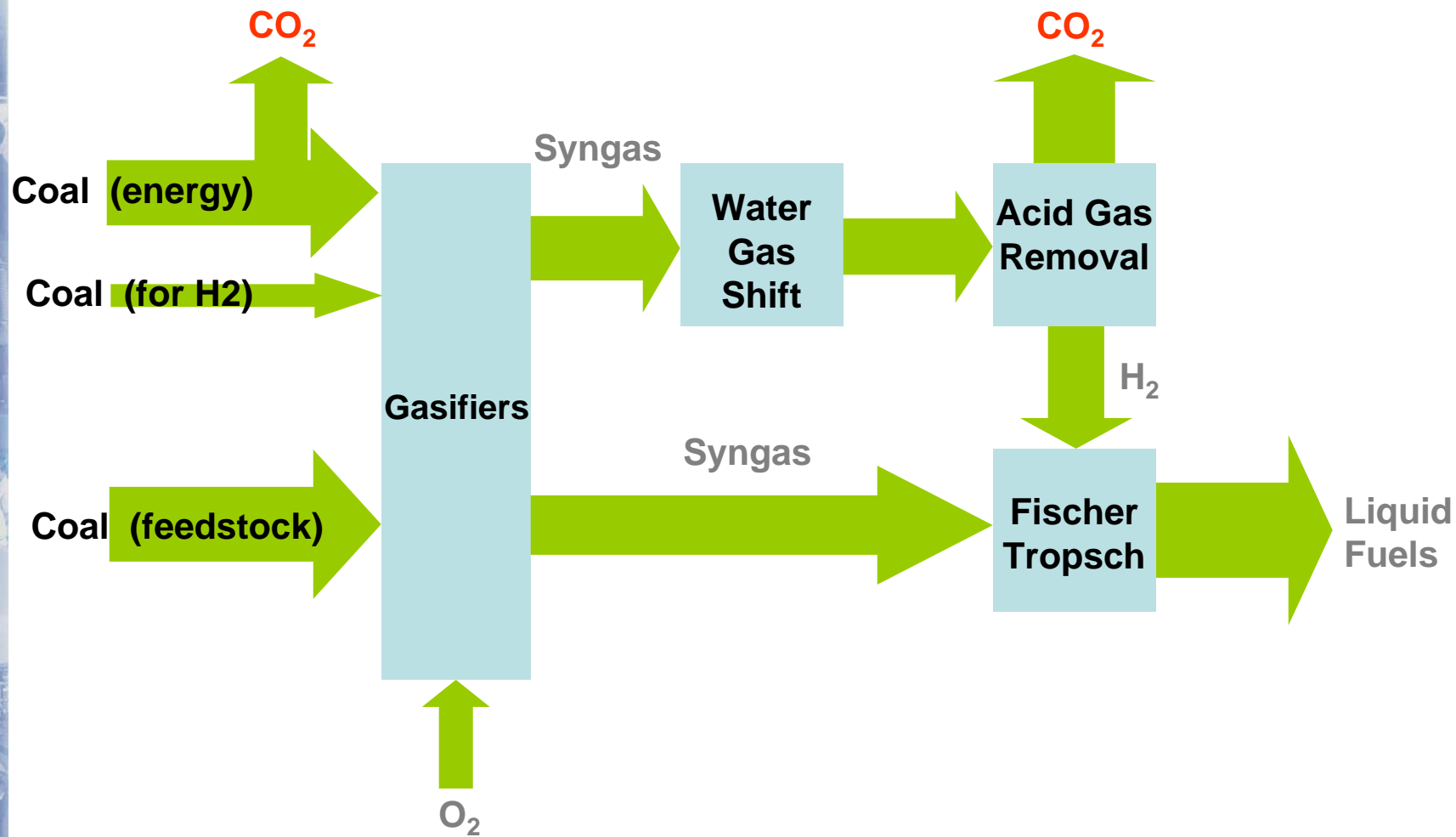
Equivalent Natural Gas Energy



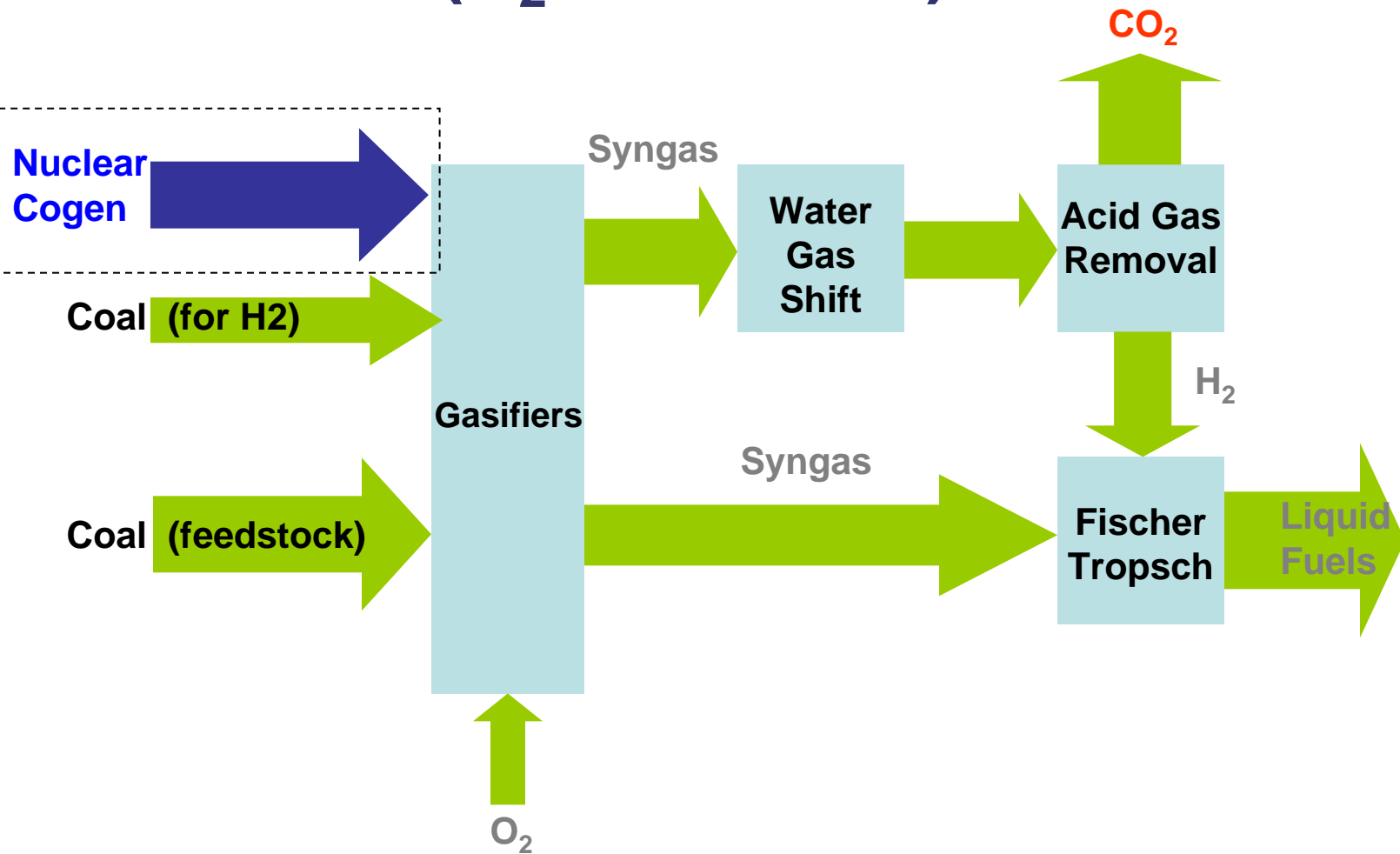
HTGR Applications Relevant to CTL

- ◆ **Power and steam production, replaces**
 - Coal fired boilers, or
 - Natural gas fired cogeneration plants
- ◆ **Hydrogen production using Steam Methane Reforming (SMR) of natural gas**
 - Reduces use of gas by ~30% from conventional SMR
- ◆ **Hydrogen production via Water Splitting**
 - Eliminates use of gas for hydrogen production
 - Eliminates oxygen plant to feed gasifier

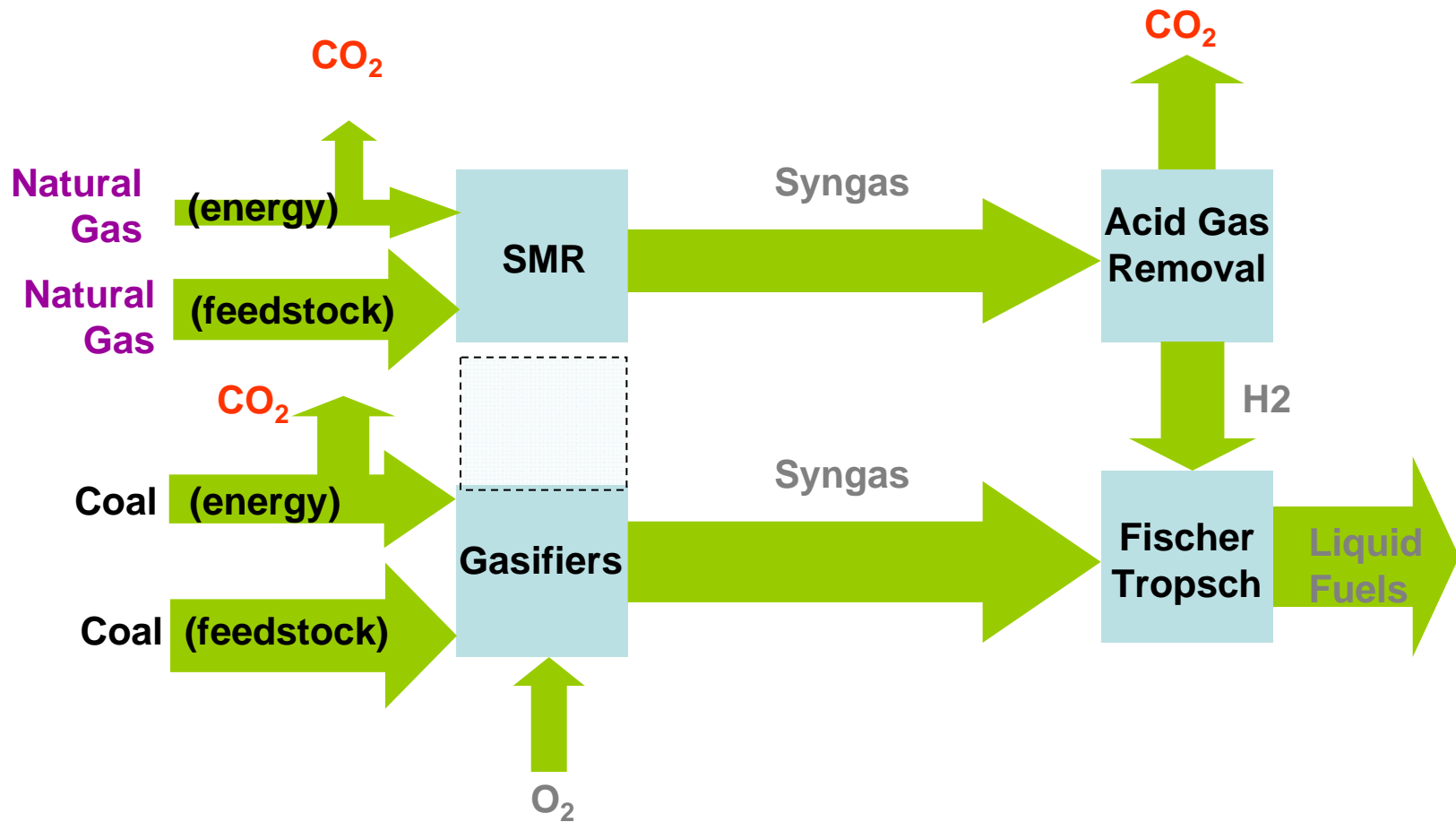
Conventional CTL (H₂ from Coal)



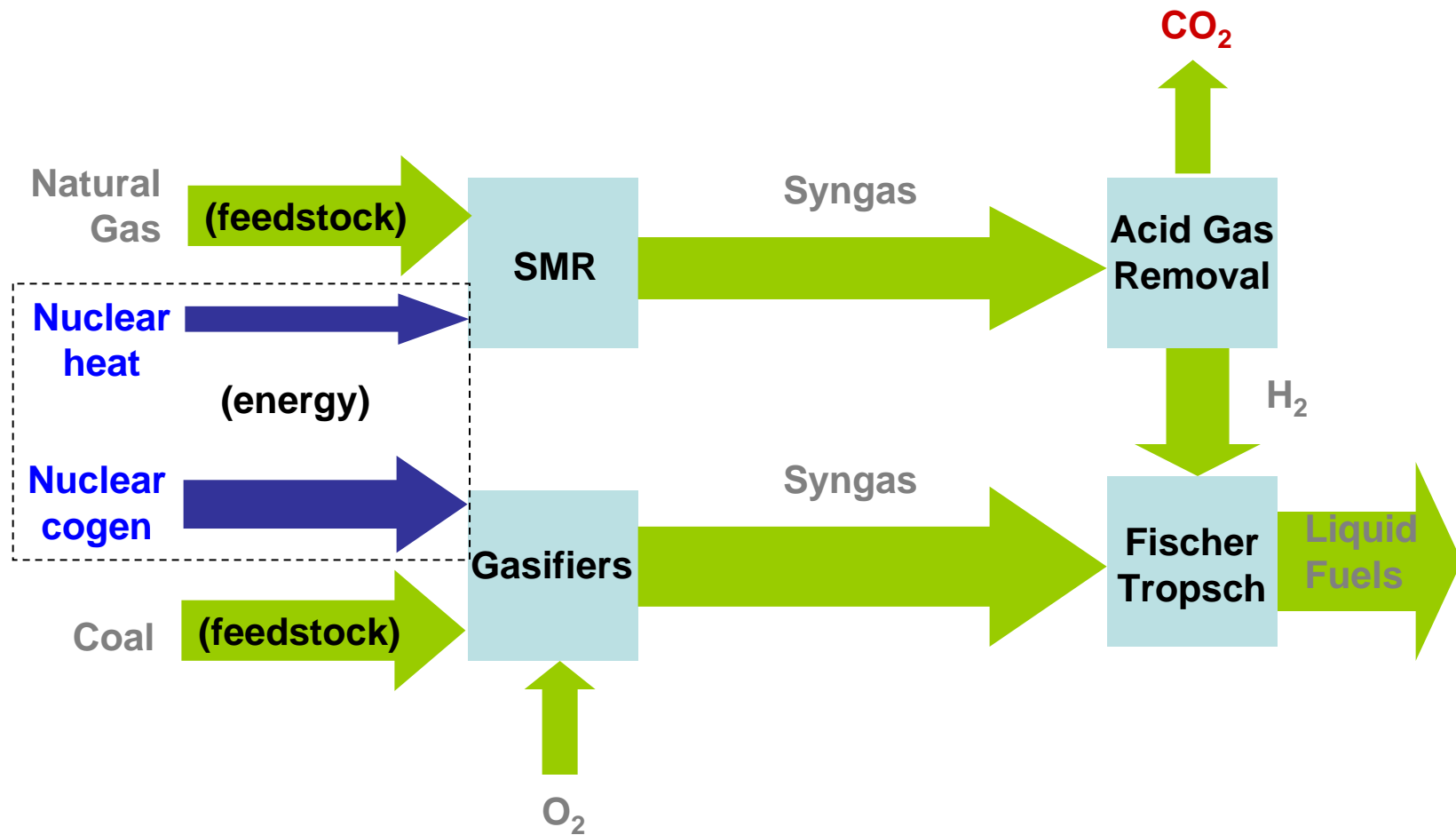
CTL with Nuclear Cogen (H₂ from Coal)



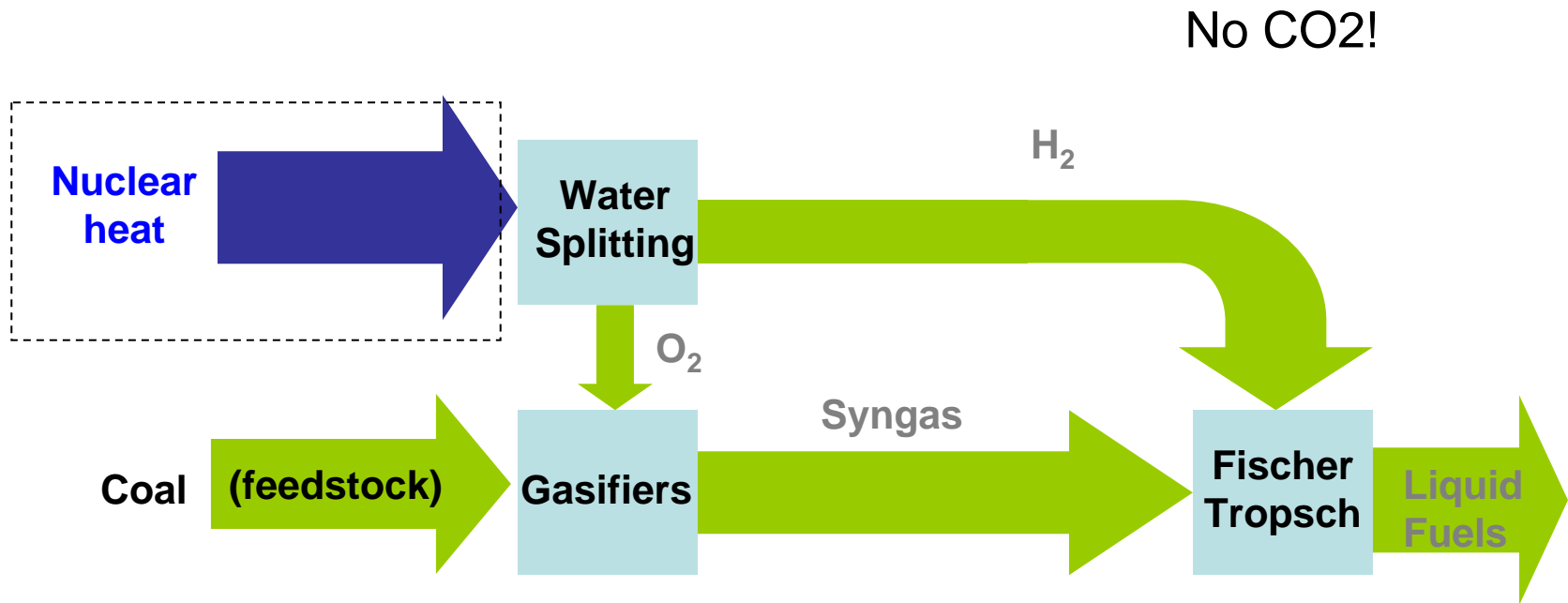
CTL with SMR (H₂ from Natural Gas)



CTL with Nuclear SMR (H₂ from Natural Gas)



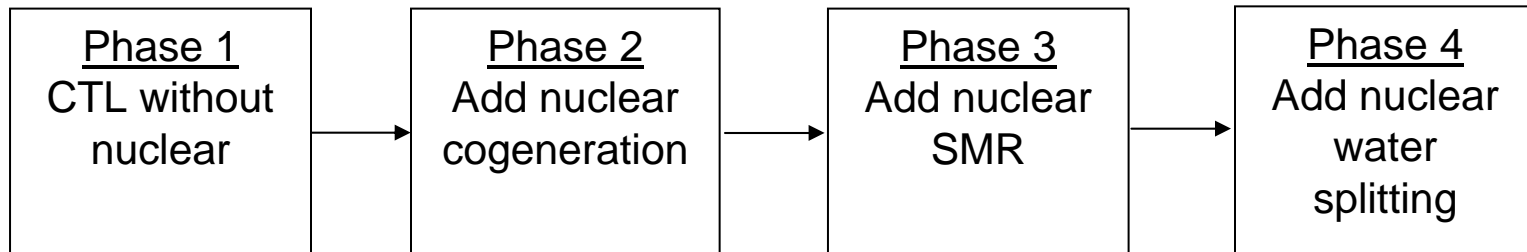
CO₂-free CTL (H₂ from Water Splitting)



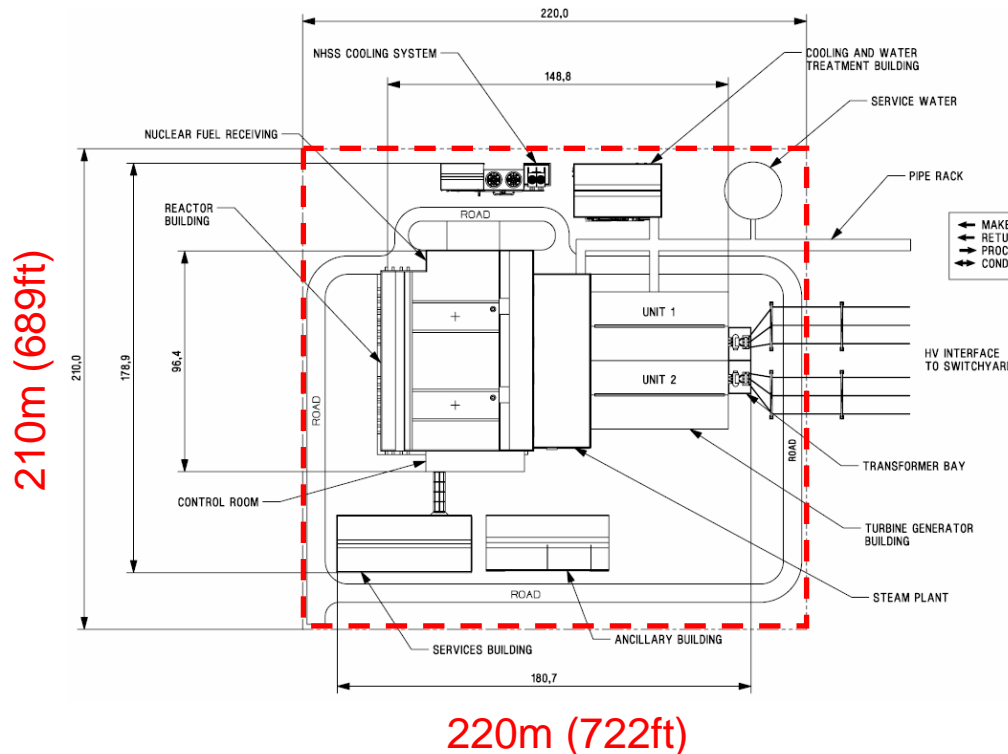
Possible CTL Sequence

- ✦ **New CTL plant**
 - Major siting/permitting challenges (no nuclear component)
- ✦ **Nuclear cogeneration**
 - Added when economical
- ✦ **Nuclear SMR**
 - Added when economical
- ✦ **Nuclear water splitting**
 - Added when economical

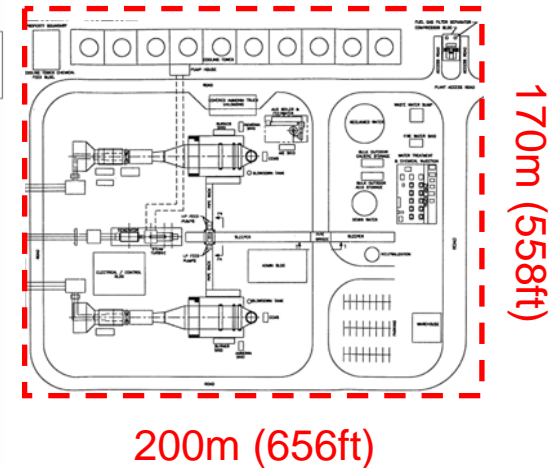
Nuclear application options



Cogeneration Site Requirements Comparison



2 x 500 MWt PBMR
nuclear cogeneration unit



Conventional gas turbine
cogeneration unit
(2 x ~500MWt)

Optionality Strategy



- ◆ Nuclear has longer lead time
- ◆ Application host provides site and offers to be offtaker based on long term option planning (with conditions/offramps)
- ◆ Third party initiates licensing, project development and financing
- ◆ Nuclear option interchangeable with others until detailed planning phase

3rd party licensing & project development

Application planning